



Unit of Study: Space Science

Stars (6 days)

TEKS 8.8 The student knows characteristics of the universe. The student is expected to:

- (A) describe components of the universe, including stars, nebulae, and galaxies, and use models such as the Hertzsprung-Russell diagram for classification.
- (B) recognize that the Sun is a medium-sized star near the edge of a disc-shaped galaxy of stars and that the Sun is many thousands of times closer to Earth than any other star.

Essential Question(s)

When thinking of our Sun, why is important to know and understand the life cycle of stars?

Guiding Question(s)

- What are characteristics of stars including our Sun?
- How are stars classified using the Hertzsprung-Russell diagram?
- How are stars different at different stages in their life cycle?

I Can Statements, I can...

- describe characteristics of stars
- explain how stars are classified using temperature and brightness
- use the H-R Diagram for star classification
- recognize that the Sun is a star close to the Earth

Learning Plan

Materials:

Computer
Multimedia Projector
Speakers
Internet
Journal
Textbook
Index cards
Glue
Scissors
Chart paper
Markers

[Stars](#) (picture)

[Stellar Fingerprints](#)

(Periodic Table of Elements, spectral patterns of elements, handout)

[Star Light, Star Bright: Exploring How Stars are Classified](#) (handout) and [Star Templates](#) (color paper)

[H-R diagram](#)

Lesson Objective – Day 1

Pose the guiding question for the lesson. To frame students' learning, display the "I Can" statement: I can describe characteristics of stars. Inform students that today they will start their study of stars by reading about the composition of stars.

Engage (Hook – Grab Students' Attention) – 10 minutes

1. Display the picture of the [stars](#) (link) so that all students can view it and pose the following questions:
 - What are stars made of?
 - How do stars differ from one another?
 - Do stars move?
2. Have students use the [Pairs Compare](#) (link) strategy to generate ideas, and then compare their answers with another pair, and then see if working together they can come up with additional responses. Have students record responses in a matrix in their science journal.

I thought...
We thought...
Others thought...
We concluded...

Explain (Teacher Input) – 10 minutes

3. Use the EduSmart video clip: **Stars** (8.8A & B) to introduce and explain stars. When the videos pauses, have students use the [Stop and Jot](#) (link) strategy to summarize learning and answer questions in their science journal. After viewing the video, students should be able to answer the following questions: (1) What is a star? (2) What are stars made of? (3) How do stars form? (4) How are stars classified? (5) What is luminosity? (6) Why does our sun seem so big and bright to us?

Vocabulary:

- Apparent magnitude
- Absolute magnitude
- H-R diagram
- Luminosity
- Main sequence
- White dwarf
- Red giant
- Black hole

Academic Vocabulary:

- Cycle
- Observe
- Categorize
- Phase
- Describe
- Predict
- Differentiate
- Characterize

Student Work:

- Journal responses
- Lab investigations
- Stellar Fingerprints
- Star Light, Star Bright: Exploring How Stars are Classified
- H-R diagram
- Storyboard

Instructional

Strategies:

Cues & Questioning
Modeling
Corrective Feedback
Discussion
Organizing Information
Journaling
Formative Assessment
[Pairs Compare](#)
[Stop and Jot](#)
[Paired Guided Reading](#)
[Paired Heads Together](#)
[Think-Pair-Share](#)
[Pairs Check](#)

Grouping:

Whole Class
Individual
Pairs
Triad (3)
Quad (4)

The AVID Way:

Writing:

- Interactive Notebook (science journal)
- Stop and Jot

Inquiry:

- Stars
- Stellar Fingerprints
- Star Light, Star Bright: Exploring How Stars are Classified

Collaboration:

- Pairs Compare
- Paired Guided Reading
- Paired Heads Together
- Think-Pair-Share
- Pairs Check

Reading:

- Textbook reference

Online Supplemental Aids for New TEKS:

[Retrieve/Access Directions](#) ([link](#))

Explore (Reading to Learn) – 20 minutes

4. Assign Chap. 23 - Section 2: pp. 630 – 632 (only sections Color of Stars & Composition of Stars) for students to read using the [Paired Guided Reading](#) ([link](#)) strategy. Give them a purpose to read such as, "Read about the color of stars and composition of stars (pp. 630 – 632) and be able to answer the following questions. (1) What is the relationship between the color stars appear and their temperature? (2) How do astronomers determine what elements a star is made of? (3) What are emission lines? (4) How are emission lines like fingerprints? (5) How can you use an absorption spectrum to explain the elements a star is composed of?"
5. Use the [Paired Heads Together](#) ([link](#)) strategy to review and discuss Chap. 23 – Section 2: pp. 630 – 632.

(Lesson Closure) – 5 minutes

6. Inform students that their "[ticket-out](#)" ([link](#)) is to complete the following sentence stem:
 - Based on the information I read I can conclude stars...

Lesson Objective – Day 2

Pose the guiding question for the lesson. To frame students' learning, display the "I Can" statement: I can describe characteristics of stars. Inform students know that today they will further describe the characteristics of stars by exploring their composition by analyzing a star's fingerprints.

Evaluate (Checking for Understanding) – 5 minutes

1. Randomly call on students and solicit oral student responses (cold calling) to assess their understanding of the composition of stars. Have them complete the following statement, "Stars are composed of _____ and I know this because ..."

Explore (Guided Practice) – 35 minutes

2. Provide each student with the student pages of the investigation [Stellar Fingerprints](#) ([link](#)). This can be a class set used for each period. Review the background information with the students.

Student Pages

Stellar Fingerprints

Adapted from Chapter 4, Fingerprints of the Stars

Objectives:

Describe characteristics of the universe (stars).
Extrapolate from collected information to make predictions.

Background:

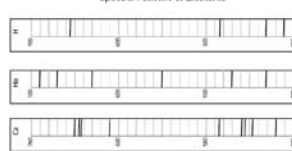
All stars start out in a specific place, a *nebula* (plural is *nebulae*). Nebulae are large areas of gas and dust and they are the areas where stars are born and sometimes die. They are mainly made up of hydrogen, helium, and other gases and dust. These elements are the key ingredients in making stars.

As stars go through life, they burn off simpler (lighter) elements in a process known as nuclear fusion. Nuclear fusion involves making simpler, (lighter) elements into more complex (heavier)

Data Table:

Star Name	Element Present in Star						
	H	He	Ca	Li	Na	Mg	Fe
Sun							
Procyon							
Betelgeuse							
Sirius							
Altair							
Atomic Number							
Atomic Mass							

Spectral Patterns of Elements



Note: This investigation will take advance preparation. Spectral patterns of elements need to be cut out so that each student has a set or you can create a class set of spectral patterns of elements to use each period.

ELPS Stems:

- I can conclude _____ because...
- Based on the information I heard in _____, I can conclude...
- The diagram tells me the text is about...
- The organizer shows me that _____ is significant because...

Laying the Foundation:

Black Holes and Beyond – Making a Black Hole

EduSmart:

The Universe (8.8A & B)

- Stars
- Stars & the HR Diagram

Ignite! Learning - Science:

Unit: Earth Science

Lesson: Stars and Galaxies

Topic # 1 What Stars Are

- How Stars Burn
- Stars: Define, Describe, Measure

Topic # 2 Properties of Stars

- Magnitude Apparent and Absolute
- Stages in a Star's Life

4. Guide students in determining the elements found in each star listed on the data table using the spectral patterns of elements. You may need to model the process with the students. Students should record information on the data table as they work through the process.
5. Have students answer the analysis questions in their science journal. If students do not have enough time to do this, allow the first 5 minutes of the next lesson to complete.

(Lesson Closure) – 5 minutes

6. Have students return class sets of handouts and materials. Randomly call on students (cold calling) to assess their understanding of the investigation, Stellar Fingerprints.

Lesson Objective – Day 3

Pose the guiding question for the lesson. To frame students' learning, display the "I Can" statement: I can explain how stars are classified using temperature and brightness. Inform students they will learn how stars are classified based on their temperature and brightness.

Evaluate (Checking for Understanding) – 15 minutes

1. Allow student 5 minutes to finish the analysis questions from the investigation Stellar Fingerprints.
2. Have students use the [Pairs Compare \(link\)](#) strategy to compare their answers with another pair. Use the [Paired Heads Together \(link\)](#) strategy to review and discuss students' responses. Ask students, "What elements are found in all stars? Why?" "What is the difference between small, medium, and large stars?" Is our Sun a small, medium, or large star? Why?"

Explore (Reading to Learn) – 20 minutes

3. Assign Chap. 23 - Section 2: pp. 632 - 634 (only sections Classifying Stars & How Bright is that Star) for students to read using the [Paired Guided Reading \(link\)](#) strategy. Give them a purpose to read such as, "Read about the classifying stars (pp. 632 – 634) and be able to answer the following questions. (1) How is temperature used to classify stars? (2) What color are the hottest stars? (3) How is the brightness of the stars used to classify them? (4) What is the difference between apparent magnitude and absolute magnitude?"
4. Use the [Paired Heads Together \(link\)](#) strategy to review and discuss Chap. 23 – Section 2: pp. 632 – 634. Students should have an understanding that blue stars are the hottest while red stars are the coolest as well as the difference between apparent magnitude and absolute magnitude.

(Lesson Closure) – 10 minutes

5. Inform students that their ["ticket-out" \(link\)](#) is to answer the following question using the words *apparent magnitude* and *absolute magnitude* in their answer:
 - If our Sun is an ordinary star, why is it the brightest object in the sky?

Lesson Objective – Day 4

Pose the guiding question for the lesson. To frame students' learning, display the "I Can" statement: I can explain how stars are classified using temperature and brightness. Inform students they will classify stars using characteristics such as color, temperature, and luminosity.

Evaluate (Checking for Understanding) – 5 minutes

1. Randomly call on students and solicit oral student responses (cold calling) to assess their understanding of the temperature of stars, as well as apparent magnitude and absolute magnitude.

Explore (Guided Practice) – 35 minutes

- Have students work in small groups to organize stars into different categories based on observations of properties for a collection of stars. For full details of the investigation click [Star Light, Star Bright: Exploring How Stars are Classified](#) (link) and the [Star Templates](#) (link). Review the procedures with the students, especially step #3 so they understand the term, **luminosity** and how luminosity is represented on each star, ie. 10,000 is bright and .001 is dim.

Star Light, Star Bright: Exploring How Stars are Classified

LP _____ Date _____

Objectives:

- Students will work in small groups to organize stars into different categories based on observations of properties for a collection of stars.

Materials:

- One set of colored and laminated stars per 4 students: [Star Set \(pdf\)](#)

Procedure:

- Ensure that students understand what type of information is known about each star by examining the sun as a class.
- Make sure children notice each star has a name, a color, a temperature and a luminosity value.
- Make sure they understand the luminosity is compared to the sun's luminosity

Note: This investigation will take advance preparation. Stars need to be cut out so that each student group has a set. You can create a class set of stars to use each period.



- Have students record the star arrangements (data tables #1 – 4) in their science journal. Also, have students record their answers to the analysis questions in their science journal. **Note:** Omit #10 and the conclusion. The conclusion will be done as a ticket out.

(Lesson Closure) – 5 minutes

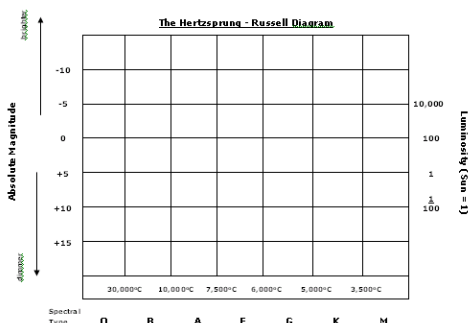
- Have students return class sets of stars. Inform students that their "ticket-out" (link) is to write 2 -3 sentences on what they learned by doing this investigation.

Lesson Objective – Day 5

Pose the guiding question for the lesson. To frame students' learning, display the "I Can" statement: I can use the H-R Diagram for star classification. Inform students they will learn how the Hertzsprung-Russell diagram is used to show the relationship between a star's surface temperature and the absolute magnitude.

Explore (Guided Practice) – 20 minutes

- Display in the classroom a [Hertzsprung-Russell \(H-R\) diagram](#) (link) so that all students can view it. Also, have available a set of [Star Templates](#) (link) from the investigation [Star Light, Star Bright: Exploring How Stars are Classified](#) (link) from Day 4.



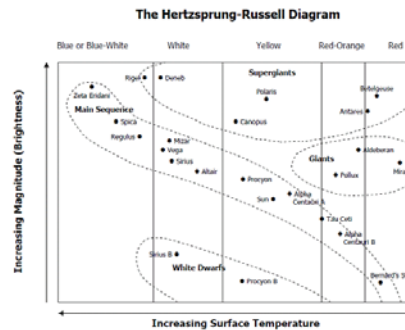
- Randomly pass out stars to the students. One at a time, call on students and have them plot their star on the H-R diagram. Guide them in this process. **Note:** Since the stars have the luminosity identified on them, make sure students use the appropriate side of the H-R diagram when making a decision of where the star should be placed.
- Once all the stars have been placed on the H-R diagram have students use the [Think-Pair-Share \(link\)](#) strategy to discuss with their elbow partner observations about the placement of stars on the H-R diagram. Discuss with the class conclusions they have made based on their observations.

Explore (Reading to Learn) – 20 minutes

- Assign Chap. 23 - Section 3: pp. 637 – 639 (The Diagram That Did It!) for students to read using the [Paired Guided Reading \(link\)](#) strategy. Give them a purpose to read such as, "Read about the H-R diagram (pp. 637- 639) and be able to answer the following questions. (1) Who developed the H-R diagram? (2) What is the purpose of the H-R diagram? (3) What color are the hottest stars and where are they located on the H-R diagram? (4) What is a main sequence star? (5) Where are the oldest stars located on the H-R diagram? (6) Where is our sun located on the H-R diagram?"
- Use the [Paired Heads Together \(link\)](#) strategy to review and discuss Chap. 23 – Section 3: pp. 637 - 639. Students should have an understanding of how the H-R diagram shows the relationship between stars' surface temperature, absolute magnitude, and luminosity.

(Lesson Closure) – 5 minutes

- Provide each student with a [H-R diagram \(link\)](#) and have them glue it into their science journal. Explain they will need this diagram for tomorrow's lesson.



Lesson Objective – Day 6

Pose the guiding question for the lesson. To frame students' learning, display the "I Can" statements I can use the H-R Diagram for star classification. Let students know they will use the H-R diagram to answer questions and also create a story board of a star's life cycle.

Evaluate (Checking for Understanding) – 20 minutes

- Post the following questions so that students see them as they enter the class.
 - Which is brighter? Aldebaran **OR** Betelgeuse
 - Which is cooler? Rigel **OR** Mira
 - Which is larger in size? Polaris **OR** Pollux
 - Which has a higher temperature? Tau Ceti **OR** Procyon B
 - Which is hotter? Regulus **OR** Deneb
 - Which is smaller in size? Sun **OR** Antares
 - Which is hotter? Zeta Eridani **OR** Rigel
 - Which is dimmer? Antares **OR** Sun

- What is larger in size? Deneb **OR** Mira
- Which has a higher temperature? Altair **OR** Alpha Centauri A
- Which is hotter? Spica **OR** Vega
- Which is smaller in size? Procyon **OR** Procyon B

2. Have students use the H-R diagram in their science journal as well as the H-R diagram found on pp. 638 – 639 in their textbook to answer the questions. Have students use the [Pairs Check \(link\)](#) strategy to work through the problems. Use the [Paired Heads Together \(link\)](#) strategy to review and discuss students' responses.

Explain (Teacher Input) – 5 minutes

3. Use the EduSmart video clip: **Stars & the HR Diagram** (8.8A & B) to introduce and explain the life cycle of stars and the H-R diagram.

Elaborate (Going Further) – 20 minutes

4. Have students create a [storyboard \(link\)](#) of a star's life cycle. Students may use resources such as their notes, textbook, and the EduSmart video clip: **Stars & the HR Diagram**. Assign unfinished work as homework to be collected next class period.

Evaluation - Assessment Evidence – 10 minutes

1. Given the H-R Diagram, students will correctly classify stars with 80% accuracy.

District FMA Example:

Temperature and color are two factors in which stars in the universe are categorized. The table below shows star color and temperature.

Star Color	Approximate Surface Temperature (K)
Blue	7,500+
Blue to white	6,000 - 7,500
White to yellow	5,000 - 6,000
Orange to red	3,500 - 5,000
Red	Under 3,500

Bellatrix is a star in the Milky Way galaxy and has a temperature of approximately 30,000 K. Bellatrix would be categorized as a (n) —

- A** blue star
- B** yellow star
- C** orange star
- D** red star

Unit of Study: Space Science

Earth-Moon-Sun (10 days)

TEKS 8.7 The student knows the effects resulting from cyclical movements of the Sun, Earth, and Moon. The student is expected to:

(A) model and illustrate how the tilted Earth rotates on its axis, causing day and night, and revolves around the Sun causing changes in seasons.

(B) demonstrate and predict the sequence of events in the lunar cycle.

(C) relate the position of the Moon and Sun to their effect on ocean tides.

Essential Question(s)

What would be the effect on your life if the Sun, Earth, and Moon did not go through cyclical movements?

Guiding Question(s)

- How does the tilt and movement of the Earth cause seasons and changes in the length of day?
- How do the Earth's movement and the moon's orbit cause the observed cyclical phases of the moon?
- What is the sequence of events in the lunar cycle?
- How does the position of the Moon and Sun effect ocean tides?

I Can Statements, I can...

- model and illustrate how the tilted Earth rotating on its axis causes day and night
- model and illustrate how the tilted Earth revolving around the Sun causes changes in seasons
- demonstrate and predict the sequence of the moon phases in the lunar cycle
- relate the position of the Moon and Sun to their effect on ocean tides

Learning Plan

Materials:

Computer
Multimedia Projector
Speakers
Internet
Journal
Textbook
Index cards
Glue
Scissors
Chart paper
Markers

[Seasons and Cycles Anticipation Guide](#)

[Modeling Day and Night](#)
(flashlight, Styrofoam ball, paperclip, tape, paper labeled w/times of day)

[Day and Night](#)
(reading passage)

[Seasons](#) (Styrofoam ball, rubber band push pins, protractor, small cup, flashlight, paper plate labeled w/months of year)

[What Causes the Seasons](#)
(reading passage)

Lesson Objective – Day 1

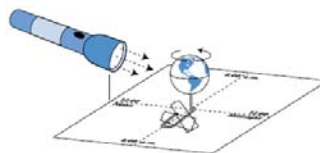
Pose the guiding question for the lesson. To frame students' learning, display the "I Can" statement: I can model and illustrate how the tilted Earth rotating on its axis causes day and night. Inform students that today they will start studying the relationship between the Earth, Moon, and Sun. Today, they will model the causes of day and night

Engage (Hook – Grab Students' Attention) – 5 minutes

1. Provide each student with a [Seasons and Cycles Anticipation Guide](#) (link). Ask students to individually read the statements in the anticipation guide and circle either an **A** for agree or **D** for disagree beside each statement in the Before Lesson column.
2. Have students glue their anticipation guides into their science journal. Explain to the students that they will return for completion after they learn more about seasons and cycles.

Explore (Guided Practice) – 35 minutes

3. Inform students that they will be conducting an investigation that will model day and night on Earth. Explain that each group will construct a model Earth and investigate what happens when light shines on the model. For full details of investigation click [Modeling Day and Night](#) (link).



Note: In this investigation, the Earth model is not tilted at 23.5° since it is only modeling how the Earth's rotation on its axis produces day and night. If you would like a more accurate model, have students tilt the Earth model slightly when placing it on the paperclip.

Vocabulary:

- Revolution
- Rotation
- Day
- Seasons
- Waxing
- Waning
- Tides
- Tidal range
- Spring tides
- Neap tides

Academic Vocabulary:

- Demonstrate
- Predict
- Sequence
- Cycle
- Illustrate
- Tilt
- Cyclical
- Relate
- Position
- Effect
- Relationship
- Gravitational
- Cyclical
- Phases

[Moon phase foldable](#)

[Lunar Lollipops](#)

(Styrofoam ball, wooden skewer, lamp)

[Moon Phases](#) (handout)

[Timing the Tides](#)

(push pin, transparency)

Instructional

Strategies:

Cues & Questioning
Modeling
Corrective Feedback
Discussion
Organizing Information
Journaling
Formative Assessment
[Stop and Jot](#)
[Pairs Compare](#)
[Think-Pair-Share](#)
Pen-in-Hand
[Paired Guided Reading](#)

Grouping:

Whole Class
Individual
Pairs
Triad (3)
Quad (4)

The AVID Way:

Writing:

- Interactive Notebook (science journal)
- Stop and Jot

Inquiry:

- Modeling Day/Night
- Seasons
- Lunar Lollipops
- Timing the Tides

Collaboration:

- Pairs Compare
- Paired Guided Reading
- Think-Pair-Share

Reading:

- Textbook reference
- Reading passage

Online Supplemental Aids for New TEKS:

[Retrieve/Access Directions](#) (link)

4. Have students draw a diagram of their model and answer the questions (#1 – 6) found on p. 5 of the handout in their science journal. Also, discuss with students the advantages and limitations of this model.

(Lesson Closure) – 5 minutes

5. Have students complete question #7 in their science journal in which the students write a paragraph describing why the sun appears overhead at noon, is visible in the western part of the sky in the evening, and cannot be seen at midnight. Students should use their observations from the investigation to complete their paragraph. Check for completion of their paragraph before students leave the class.

Lesson Objective – Day 2

Pose the guiding question for the lesson. To frame students' learning, display the "I Can" statement: I can model and illustrate how the tilted Earth rotating on its axis causes day and night. Let students know that today they will further explore how the Earth's rotation causes day and night.

Evaluate (Checking for Understanding) – 10 minutes

1. Randomly call on students and solicit oral student responses (cold calling) to share their paragraph from the previous day. Clarify any misconceptions students may have.

Explain (Teacher Input) – 10 minutes

2. Use the EduSmart video clip: **Day and Night** (8.7A) to explain how day and night occurs. When the videos stops, have students use the [Stop and Jot](#) (link) strategy to summarize learning and answer questions in their science journal. After viewing the video, students should be able to answer the following questions: (1) Why does the Sun always rise in the east and set in the west? (2) When it's daytime in Texas, what time is it Africa? Why? (3) How often does the cycle of day and night occur? (4) Why does the Sun appear to travel across the sky?

Explore (Reading to Learn) – 20 minutes

3. Provide each student with the reading passage [Day and Night](#) (link). Have students preview the questions in the boxes found along the side of the reading passage.

Day and Night

The changes of day and night are caused by the Earth's rotation on its axis. As the Earth rotates, one-half of the planet faces the Sun at any given time. The half facing toward the Sun has day; the side facing away from the Sun has night.

Since the Earth makes one complete spin or rotation every 24 hours, you might think that day and night would be equal in length. For most of the year, the number of hours of day and night is unequal. On two days of the year, every place on the Earth has an equal 12 hours of day and 12 hours of night. The two days happen on March 21, the beginning of spring, and September 23, the beginning of autumn. In the summer, days are longer and nights are shorter. In the winter, days are shorter and nights are longer. The reason why daylight hours vary in length throughout the year is because the Earth's axis is not straight up and down but is tilted 23.5° from the vertical. If the Earth were not tilted on its axis, all parts of the Earth

What causes day and night on Earth?

Why do most places on the Earth not have equal hours of day and night?

When does the longest days and

4. Instruct students to read the passage. Have students use the [Pairs Compare](#) (link) strategy to discuss the main ideas of each paragraph and answer the questions in the boxes. Discuss the main points of the reading passage with the class.

(Lesson Closure) – 5 minutes

5. Inform students that their "[ticket-out](#)" (link) is to illustrate how the Earth rotates on its axis causing day and night. Students should label the following in their illustration: *Earth, Sun, day, night* an arrow showing the direction of Earth's rotation.

Lesson Objective – Day 3

Pose the guiding question for the lesson. To frame students' learning, display the "I Can" statement: I can model and illustrate how the tilted Earth revolving around the Sun causes changes in seasons. Inform students that today they will investigate what causes the changes of the seasons.

Engage (Hook – Grab Students' Attention) – 5 minutes

1. Pose the following question to the students, "What causes the changes in the Earth's seasons?" Have students use the [Think-Pair-Share](#) (link) strategy to discuss with their elbow partner their thoughts and ideas. Debrief with the class.

Student Work:

- Journal responses
- Lab investigations
- Modeling – Day/Night; Season; Lunar cycle; Tides
- Foldable
- Diagram (lunar cycle)
- Graphing (tides)

ELPS Stems:

- I would explain the concept to a friend by...
- What I know about _____ is ...
- I think ...
- Would you please show me on the _____ (diagram, etc.)

Laying the Foundation:

[Reasons for the Seasons-](#)

Exploring What Causes the Seasons

[Moon Watch](#)

Observing the Lunar Phases with a Model

EduSmart:

Sun, Moon, Earth (8.7A, B, C)

- Day and Night
- Seasons
- Phases of the Moon
- Tides

Ignite! Learning - Science:

Unit: Earth Science

Lesson: Earth, Moon, Sun

Topic # 2 Earth's Rotation and Revolution

- Why do we have Days and Years?

Topic # 3 Earth's Tilt and Seasons

- What Causes Earth's Seasons

Topic # 4 Seasons

- Seasons in the Hemisphere
- Earth's Seasons and the Sun

Topic # 6 The Lunar Cycle

- The Moon's Eight Phases
- Phases of the Moon

Lesson: Earth's Ocean

Topic # 3 Tides

- High and Low Tides
- The Mystery of Earth's Tides

Explore (Guided Practice) – 35 minutes

- Inform students that they will be conducting an investigation to explore the times of the year when different parts of the Earth receive direct and indirect rays from the Sun and as a result cause a change in the seasons on the Earth. For full details of investigation click [Seasons \(link\)](#).

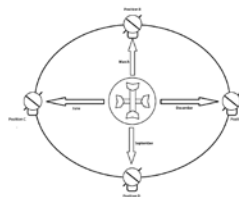
Seasons
Purpose: To explore the times of the year when different parts of the Earth receive direct and indirect rays from the Sun and as a result cause a change in the seasons.

Materials:

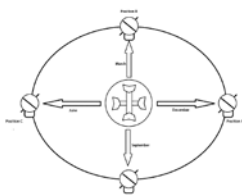
- Styrofoam ball
- Pushpin: hand
- Zip-tying
- Protractor
- Small cup
- Flashlight
- Page plate divided into quarters
- Labels: December, March, June, and September
- Model of star to represent Polaris (sphere or spherical shape)

Procedure:

- The equator is an imaginary line drawn around a planet halfway (between the poles). The equator divides the



- Students should draw a diagram of their model in their science journal as well as record their observations. Students should also copy the table from question 14 in their science journal and complete.



14. Use the model and what you have learned about the seasons to complete the table below:

Event	Month	Season beginning in Northern Hemisphere	Season beginning in Southern Hemisphere	Location receiving Sun's Direct Rays
Summer Solstice				
Autumn Equinox				
Winter Solstice				
Spring Equinox				

- Guide students through the procedures outlined in the investigation by asking the following questions:

- Which hemisphere is receiving the direct rays of the Sun when Earth is located at Position A? Which hemisphere is having summer in this position? Winter?
- Which part of the Earth receives the direct rays of the Sun when Earth is located at Position B? Which hemisphere is having spring in this position? Autumn?
- Which hemisphere is receiving the direct rays of the Sun when Earth is located at Position C? Which hemisphere is having summer at this position? Winter?
- Which part of the Earth receives the direct rays of the Sun when Earth is located at Position D? Which hemisphere is having spring at this position? Autumn?
- At which position on the model do the Sun's direct rays hit the Northern Hemisphere? {Explain this is the summer solstice which marks the beginning of summer and is the longest day of the year.}
- At which position on the model does the Northern Hemisphere receive the least direct rays from the Sun? {Explain this is the winter solstice which marks the first day of winter and is the shortest day of the year.}
- At which two positions on the model does the equator receive the Sun's direct rays? {Explain these dates are called the equinoxes and mark the first day of spring and autumn. These dates have an equal amount of day and night.}
- Discuss with students the advantages and limitations of this model.

(Lesson Closure) – 5 minutes

- Have students write 2 – 3 sentences in the science journal explaining what causes the change in Earth's seasons. Students should use their observations from the investigation to complete their paragraph. Check for completion of their paragraph before students leave the class.

Lesson Objective – Day 4

Pose the guiding question for the lesson. To frame students' learning, display the "I Can" statement: I can model and illustrate how the tilted Earth revolving around the Sun causes changes in seasons. Let students know that today they will further explore how the Earth's tilt and revolution around the Sun causes the changes in Earth's seasons.

Evaluate (Checking for Understanding) – 10 minutes

1. Randomly call on students and solicit oral student responses (cold calling) to share their paragraph from the previous day. Clarify any misconceptions students may have.

Explain (Teacher Input) – 10 minutes

2. Use the EduSmart video clip: **Seasons** (8.7A) to explain the changes in Earth's seasons. When the videos stops, have students use the [Stop and Jot \(link\)](#) strategy to summarize learning and answer questions in their science journal. After viewing the video, students should be able to answer the following questions: (1) What is leap year and what is the purpose of it? (2) What causes the different seasons? (3) Why does the Northern Hemisphere and the Southern Hemisphere have opposite seasons?

Explore (Reading to Learn) – 20 minutes

3. Provide each student with the reading passage [What Causes the Seasons? \(link\)](#). Have them use the Pen-in-Hand strategy to read the information. Provide students with highlighters and give them a purpose to read such as, "Read this information and be able to explain the factors that causes the seasons."

What Causes The Seasons?

Earth's seasons are caused by two factors:

- Earth's revolution around the sun
- Earth's tilt on its axis

Earth Moves Around the Sun

In addition to rotating, Earth travels, or *revolves*, around the sun. *Revolution* is the movement of one object around another. One revolution of Earth around the sun is called a year. Earth's path around the sun, or *orbit*, is a slightly elongated circle, or ellipse. Earth's orbit brings the planet closest to the sun in January. Although Earth's revolution affects seasons, it is important to note that the change in Earth's distance from the sun is not the cause of seasons.

Earth's Axis is Tilted Relative to Its Orbit

4. Have students answer the questions at the end of the reading passage in their science journal.
5. Debrief with class the main points of the reading passage.

(Lesson Closure) – 5 minutes

6. Have students revisit their [Seasons and Cycles Anticipation Guide](#) in their science journal. Ask students to individually read the statements in the anticipation guide and circle either an **A** for agree or **D** for disagree beside each statement in the After Lesson column. Discuss with students how their ideas about the causes of day/night and seasons have changed since the start of this lesson.

Lesson Objective – Day 5

Pose the guiding question for the lesson. To frame the students' learning, display the "I Can" statement: I can demonstrate and predict the sequence of the moon phases in the lunar cycle. Let students know that today they will begin learning about the lunar cycle and the sequence of events of the cycle.

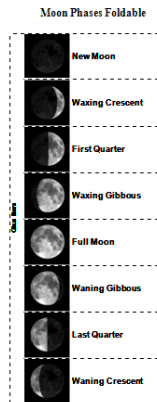
Engage (Hook – Grab Students' Attention) – 10 minutes

1. Pick 3 volunteers - one will be the moon, another will be the Earth, and the last will be the sun. Have the sun stand 5 meters from the Earth and hold a bright flashlight. Instruct the moon to stand 1 meter away from Earth. Tell the moon to slowly orbit the Earth while keeping their face turned toward the Earth. Have the sun turn on the flashlight and point the light toward Earth and the moon. Darken the room. Ask students: (1) How much of the moon is lit by the flashlight? (2) Why do we also see the same side of the moon? (3) What does this activity model? (4) What are the limitations of this model?

2. Lead a discussion with students about how we always see the same side of the moon.

Explain (Teacher Input) – 30 minutes

3. Provide each student with a [moon phase foldable \(link\)](#) and have them glue it into their science journal.



4. Explain the lunar cycle using the power point [Moon Phases \(link\)](#). Have students take notes describing each phase of the lunar cycle using the foldable from Step # 3.

(Lesson Closure) – 5 minutes

5. Summarize the learning by soliciting oral student responses (cold calling). Ask students about the different phases of the moon in the lunar cycle. Students should use specific characteristics about the different phases they learned today.

Lesson Objective – Day 6

Pose the guiding question for the lesson. To frame the students' learning, display the "I Can" statement: I can demonstrate and predict the sequence of the moon phases in the lunar cycle. Let students know that today they will continue to study the lunar cycle and the sequence of events of the cycle.

Evaluate (Checking for Understanding) – 10 minutes

1. Provide groups of students with the [moon phase pictures \(link\)](#). Randomly call out different phases of the moon and have students determine which picture represents the phase. Move around the room and check students' responses and correct as necessary.

Explain (Teacher Input) – 10 minutes

2. Use the EduSmart video clip: **Moon Phases** (8.7B) to explain the moon phases. When the videos stops, have students use the [Stop and Jot \(link\)](#) strategy to summarize learning and answer questions in their science journal. After viewing the video, students should be able to answer the following questions: (1) How long does it take the moon to revolve around Earth? (2) Why don't we see the moon during the New Moon phase? (3) What are the terms "waxing" and "waning" used to describe?

Explore (Reading to Learn) – 15 minutes

3. Have students use the Pen-in-Hand strategy as they read Chap. 20 - Section 3: The Lunar Cycle (p. 550). Have students refer to their moon phase foldable in their science journal (Day 5 – Step # 3) and add information they need to better understand the lunar cycle.

(Lesson Closure) – 10 minutes

4. Refer to students to Figure 22 on p. 550 and have them draw a diagram of the lunar cycle in their science journal. Have students add the Sun to their diagram. Check students' journal for completion and accuracy before students leave the class.

Lesson Objective – Day 7

Pose the guiding question for the lesson. To frame students' learning, display the "I Can" statement: I can demonstrate and predict the sequence of the moon phases in the lunar cycle. Let students know that today they will model the lunar cycle.

Explore (Guided Practice) – 35 minutes

1. Have students model the lunar cycle using a Styrofoam ball, wooden skewer, and a light source.
For full details of activity click [Lunar Lollipops \(link\)](#).

Lunar Lollipops

An activity submitted by Hank Thoenes

Type of Lesson: Hands-on activity

Time Needed: 35 minutes

Quick Summary of Lesson

After completing this activity students should understand that the observed phase of the Moon is determined by the Moon's position relative to the Earth and Sun.

Materials

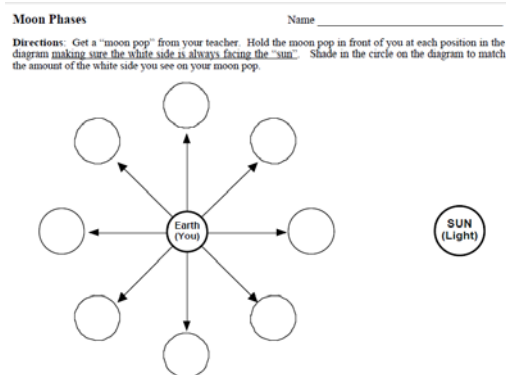
Light bulb (suspended from ceiling or on a stand)
Styrofoam balls 2-3 inches in diameter (1 per student)
Plenty of room for your students to rotate in!

Procedure

1. Turn on the model sun and turn off the other lights in the room. Have your students stand. Tell them in this system the lamp is the sun and their head is the earth. Their nose is their hometown

(Lesson Closure) – 10 minutes

2. Provide each student with [Moon Phases handout \(link\)](#). Have students complete using their understanding of the lunar cycle. If students do not complete before the end of class, assign as homework and pick up at the beginning of the next class period.



Lesson Objective – Day 8

Pose the guiding question for the lesson. To frame the students' learning, display the "I Can" statement: I can demonstrate and predict the sequence of the moon phases in the lunar cycle. Let students know that today they will review the phases of the lunar cycle

Evaluate (Checking for Understanding) – 5 minutes

1. Pick up homework from the previous day. Review with students their responses from the Moon Phase handout.

Explore (Independent Practice) – 30 minutes

2. Organize students into groups of three. In each group, identify one person as the "sun", one person as the "Earth", and person as the 'moon.'
3. Draw a sketch of one phase of the moon and display it so that all students can see it.

4. Have groups of students organize themselves as quickly as possible to show the positions of the Earth, the sun, and the moon during that phase. Check each student group for accuracy.
5. Repeat the process with different phases of the moon.

(Lesson Closure) – 10 minutes

6. Inform students that their ["ticket-out"](#) ([link](#)) is summarize their understanding of the lunar cycle. In their summary, students should use the following words: *moon, Earth, sun, waxing, waning, cycle*.

Lesson Objective – Day 9

Pose the guiding question for the lesson. To frame the students' learning, display the "I Can" statement: I can relate the position of the Moon and Sun to their effect on ocean tides. Let students know that today they will learn about tides and how the moon influences them.

Engage (Hook – Grab Students' Attention) – 5 minutes

1. Pose the following question to the students: "What role does the moon have in causing tides?"

Explain (Teacher Input) – 10 minutes

2. Use the EduSmart video clip: **Tides** (8.7C) to explain the causes of tides. When the videos stops, have students use the [Stop and Jot](#) ([link](#)) strategy to summarize learning and answer questions in their science journal. After viewing the video, students should be able to answer the following questions: (1) What causes tides? (2) When does the Sun's gravity greatly affect tides? (3) What are spring tides and neap tides? (4) In what positions are the moon, sun, and Earth in relation to one another during spring tides and neap tides? (5) Why would you not want to stay on a beach on a night with a full moon?

Explore (Reading to Learn) – 20 minutes

3. Assign Chap. 20 - Section 3: pp. 548 - 549 (The Lure of the Moon) and Chap. 20 – Section 3: pp. 551 (Tidal Variations) for students to read using the [Paired Guided Reading](#) ([link](#)) strategy. Give them a purpose to read such as, "Read about the effect the moon has on tides and be able to answer the following questions. (1) What are tides? (2) How often do tides occur? (3) What role does the moon have in causing tides?"
4. Discuss the main points of the reading passage with the class.

(Lesson Closure) – 10 minutes

5. Have students develop a Magnet Summary for the word "tides" in their science journal.

Describing Words	Describing Words
Magnet Word	Original Sentence with describing words from front of the card
Describing Words	Describing Words

Lesson Objective – Day 10

Pose the guiding question for the lesson. To frame the students' learning, display the "I Can" statement: I can relate the position of the Moon and Sun to their effect on ocean tides. Let students know that today they will investigate the timing of the tides.

Evaluate (Checking for Understanding) – 5 minutes

1. Randomly call on students and solicit oral student responses (cold calling) to assess their understanding the tides. Have them complete the following statement, "Tides are... Clarify any misconceptions students may have.

Explore (Guided Practice) – 35 minutes

- Have students investigate and describe how the times of high and low tide change from one day to the next and also describe why the times of high and low tide change from one day to the next. For full details of the investigation click on [Timing the Tides](#) (link).

Name _____

Timing the Tides

Purpose: 1) collect data by observing and measuring
2) organize, analyze, evaluate, make inferences, and predict trends from direct and indirect evidence;
3) communicate valid conclusions
4) Describe how the times of high and low tide change from one day to the next.
5) Describe why the times of high and low tide change from one day to the next.

Background Information:

Tides are the periodic rise and fall of the ocean waters. They are caused by the gravitational pulls of the Moon and (to a lesser extent) Sun, as well as the rotation of the Earth.

(Lesson Closure) – 5 minutes

- Inform students that their "ticket-out" (link) is to draw a diagram of the positions of the Earth, moon, and sun during a spring tide and a neap tide.

Evaluation - Assessment Evidence – 10 minutes

- Given models of the Earth and the sun, students will correctly model the how the tilt of the rotating Earth causes day/night and how the revolving Earth causes the seasons with 80% accuracy.
- Given the different phases of the moon, students will demonstrate the correct position of the Earth, moon, and sun with 80% accuracy.
- Given the position of the moon and sun, students will correctly identify the ocean tides with 80% accuracy.

TAKS 2009 Example:

Ancient Trees

The climate in central California's White Mountains is cold and dry. Clouds traveling east tend to lose their moisture over the Sierra Nevada, a large mountain range just west of the White Mountains. For this reason, the White Mountains receive less than 30 cm of precipitation per year. Most of this precipitation falls as snow.

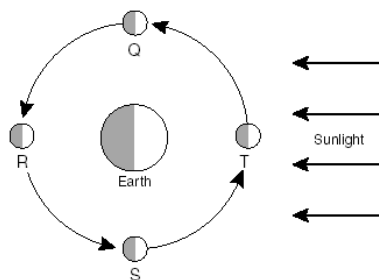
The White Mountains are the home of the oldest living trees on Earth, bristlecone pines that can survive thousands of years. Bristlecone pines have several strategies for surviving in this dry environment. These trees often grow in patches of dolomite soil. Dolomite is a type of limestone that holds more moisture than the surrounding sandstone. The light color of the dolomite soil reflects sunlight, helping keep the trees' roots cool and conserving the limited moisture. Needles on these trees can live 20 to 30 years. They provide a stable source of photosynthesis for many years.

These ancient trees teach scientists about Earth's climate history. Each spring and summer the trees grow a layer of new cells between the living wood and the bark. The trees grow more in a wet year than in a dry year. Because these trees live a long time, they can be used as a record of climate change over thousands of years.

- 13 A bristlecone pine in the White Mountains usually adds a new ring when which of the following occurs?

- A Earth's daily rotation is complete.
- B The full moon causes a monthly high tide.
- C The new moon is visible from Earth's surface.
- D Earth's Northern Hemisphere is tilted toward the sun.

TAKS 2006 Example:



The diagram shows the orbit of the moon around Earth. Between which two points will the moon appear to change from a new moon to a quarter moon?

- A Q and R
- B R and S
- C S and T
- D T and Q

Unit of Study: Organisms & Environments

Environmental Interactions (7 days)

TEKS 7.5 The student knows that interactions occur between matter and energy. The student is expected to:
(C) diagram the flow of energy through living systems, including food chains, food webs, and energy pyramids.

TEKS 7.10 The student knows that there is a relationship between organisms and the environment. The student is expected to:
(B) describe how biodiversity contributes to the sustainability of an ecosystem.

TEKS 8.11 The student knows that interdependence occurs among living systems and the environment and that human activities can affect these systems. The student is expected to:
(A) describe producer/consumer, predator/prey, and parasite/host relationships as they occur in food webs within marine, freshwater, and terrestrial ecosystems.
(B) investigate how organisms and populations in an ecosystem depend on and may compete for biotic and abiotic factors such as quantity of light, water, range of temperatures, or soil composition.

Essential Question(s)

How do animals and plant interact within the ecosystem around them?

Guiding Question(s)

- How does energy flow through living systems?
- How does biodiversity contribute to the sustainability of an ecosystem?
- What are the relationships that occur in food webs within different ecosystems?
- What is the difference between abiotic and biotic factors?
- How do organisms and populations in an ecosystem depend on and compete for biotic and abiotic factors?

I Can Statements, I can...

- diagram the energy flow through living systems
- describe how biodiversity contributes to the sustainability of an ecosystem
- describe predator/prey, producer/consumer, and parasite/host relationships as they occur in food webs within different ecosystems
- identify and explain biotic and abiotic factors of an ecosystem
- investigate and explain how organisms in an ecosystem depend on and compete for biotic and abiotic factors

Learning Plan

Materials:

Computer
 Multimedia Projector
 Speakers
 Internet
 Journal
 Textbook
 Index cards
 Glue
 Scissors
 Chart paper
 Markers

[Ecosystem](#) (picture)

[Interdependence Among Living Systems](#)
 (reading passage)

[Competition](#) (plastic spoons, plastic cups, plastic beads/dry beans)

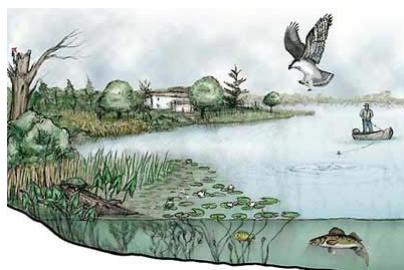
[Relationships in Ecosystems](#) (reading passage)

Lesson Objective – Day 1

Pose the guiding question for the lesson. To frame students' learning, display the "I Can" statement: I can identify and explain biotic and abiotic factors of an ecosystem. Inform students that today they will be learning the difference between abiotic and biotic factors found in an ecosystem.

Engage (Hook – Grab Students' Attention) – 15 minutes

1. Display the picture of an [ecosystem](#) (link) so that all students can view it. Ask students to list in their science journal all the living and non-living objects they can find. Suggest to students to make a T-chart to categorize their findings.



Living	Non-Living

2. Have students use the [Pairs Check](#) (link) strategy to compare their answers with their elbow partner.
3. Randomly call on students (cold calling) to identify living and non-living components of the picture. Record students' responses on a large T-chart so the entire class can see it.

Vocabulary:

- Ecosystem
- Abiotic
- Biotic
- Predator
- Prey
- Parasitism
- Producer
- Consumer
- Food chain
- Food web
- Energy pyramid
- Biodiversity
- Competition

Academic Vocabulary:

- Describe
- Interaction
- Compete
- Composition
- Contributes
- Sustainability

[Describing Relationships](#)
(handout)

Food Webs – [marine](#), [freshwater](#), [terrestrial](#)

Instructional Strategies:
Cues & Questioning
Modeling
Corrective Feedback
Discussion
Organizing Information
Journaling
Formative Assessment
[Pairs Check](#)
[Think-Pair-Share](#)
[Paired Heads Together](#)
[Paired Guided Reading](#)
Jigsaw/expert groups

Grouping:
Whole Class
Individual
Pairs
Triad (3)
Quad (4)

The AVID Way:
Writing:

- Interactive Notebook (science journal)
- Stop and Jot

Inquiry:

- Competition
- Describing Relationships

Collaboration:

- Pairs Check
- Think-Pair-Share
- Paired Heads Together
- Paired Guided Reading
- Jigsaw/expert groups

Reading:

- Textbook reference
- Reading passages

Online Supplemental Aids for New TEKS:

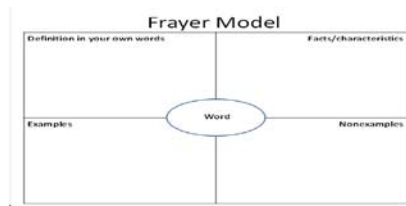
[Retrieve/Access Directions](#) (link)

Explain (Teacher Input) – 20 minutes

4. Use the EduSmart video clip: **Ecosystems** (8.11A & B) to introduce and explain what an ecosystem is and biotic (living) and abiotic (non-living) factors of it.
5. Reinforce with the students the following points:
 - Where an organism lives must contain resources to provide energy, water, and gases for survival.
 - In order to stay alive, organisms must interact constantly with their surroundings by responding to living and non-living parts of their environment.
 - The living parts of the environment are called biotic and include all living organisms such as plants and animals.
 - The non-living parts of the environment are called abiotic which means "without life". Abiotic parts of an environment include water, light, air, temperature, soil, rocks, and wind.
 - The combined living (biotic) and non-living (abiotic) parts of an environment make up an ecosystem.

(Lesson Closure) – 10 minutes

6. In their science journals, have students create Frayer Models for the following words: *Abiotic* and *Biotic*.



Lesson Objective – Day 2

Pose the guiding question for the lesson. To frame students' learning, display the "I Can" statement: I can investigate and explain how organisms in an ecosystem depend on and compete for biotic and abiotic factors. Let students know that today they will read about the interdependence that occurs among living systems.

Evaluate (Checking for Understanding) – 5 minutes

1. Summarize the learning by soliciting oral student responses (cold calling) to answer the guiding question "What is the difference between abiotic and biotic factors in an ecosystem?" Students should use specific examples of abiotic and biotic factors in their responses.

Explore (Reading to Learn) – 30 minutes

2. Provide students the reading material [Interdependence Among Living Systems](#) (link). Have students number from 1 to 3. Designate an area for the students who are "1s" to gather; do the same for the "2s" and "3s". Students will [jigsaw](#) (link) the reading and become an expert in their area.

Interdependence in Living Systems

Guiding Question: How do organisms depend on and compete for biotic and abiotic factors?

What is an ecosystem?
Prairie dogs, ferrets, owls, grasses, and black-eyed Susans, which are plants, are all part of the same ecosystem. An ecosystem is all the organisms living together in an area along with their physical environment. A prairie is an example of an ecosystem. To meet its needs, a prairie dog must interact with more than just the other prairie dogs within its ecosystem.

Why are biotic factors important in an ecosystem?
Biotic Factors: The parts of an ecosystem that are living, or were once living, are called **biotic factors**. The plants that provide food for animals in an ecosystem are biotic factors. Along with the prairie dogs in a prairie ecosystem, the ferrets and eagles that hunt them are also biotic factors. Worms and bacteria are biotic factors that live in the soil beneath the grass. As products of living organisms, prairie-dog droppings, owl pellets, and decomposing plant matter are also biotic factors.

What biotic factors can you see in the ecosystem shown in the diagram to the right?

Student Work:

- Journal responses
- Lab investigations
- T-chart
- Frayer Model
- Ticket out
- Competition (investigation)
- Describing Relationships

ELPS Stems:

- First...Second...Finally ...
- The ____ can be represented with...
- ____ is the most important attribute because...
- Evidence for my conclusion includes...

Laying the Foundation:

[Create a Species](#)-Describing a New Imaginary Species
[Clouds, Cockatoos, and Cacti](#)-Investigating Abiotic and Biotic Factors

EduSmart:

Interrelationships between Organisms (8.11A 7 B)
• Ecosystems
Energy Flow in Ecosystems (7.5C)
• Components of a Food Chain
• Food Webs
• The Energy Pyramid
Diversity of Life (7.10B)
• Biodiversity and Ecosystem Sustainability

Ignite! Learning - Science:

Unit: Life Science
Lesson: Ecosystems
Topic # 2 Abiotic and Biotic Resources

- Biotic and Abiotic Resources
 - Resources: Biotic and Abiotic
- Topic # 8 Interactions in Ecosystems
- Five Interactions in Ecosystems
- Lesson: Ecosystems
Topic # 3 Energy Flow
- Energy Flow in a Food Chain
 - Sequencing the Food Chain

3. Chunk the reading material into 3 parts and have students read their specified section. This sustained reading activity will take at least 15 minutes. You will need to monitor reading and facilitate group discussions.
4. After groups have been given a significant amount of time to read and discuss the reading material assigned to them (about 15 minutes), have students reconfigure into groups of 3. Make sure that each student group has representation from the 1s, 2s, and 3s. Within each group, have each student take turns to "teach" the students in the group their assigned reading material.
5. Discuss with students the main ideas and points of the reading material.

(Lesson Closure) – 10 minutes

6. Inform students that their ["ticket-out"](#) ([link](#)) is to answer the following questions:
 - How are biotic factors similar to abiotic factors? How are they different?

Lesson Objective – Day 3

Pose the guiding question for the lesson. To frame students' learning, display the "I Can" statement: I can investigate and explain how organisms in an ecosystem depend on and compete for biotic and abiotic factors. Let students know that today they will investigate how an organism would compete for a biotic factor.

Evaluate (Checking for Understanding) – 10 minutes

1. Post the following words so that students can see them:
 - Whale
 - Clouds
 - Water
 - Fish
 - Sand
 - Snail
 - Air
 - Sun
 - Tree
 - Deer
2. Have students classify the organisms listed above into two groups: Abiotic and Biotic. Students can create a T-chart in the science journal to group the organisms. Students may use the [Pairs Check](#) ([link](#)) strategy to compare their answers with their elbow partner.

Abiotic	Biotic

3. Randomly call on students (cold calling) to identify abiotic and biotic factors. Record students' responses on a large T-chart so the entire class can see it.

Explore (Guided Practice) – 25 minutes

4. Provide student groups (2 – 4 students) the lab investigation [Competition \(link\)](#). Have students preview the investigation in order to identify unfamiliar words and ask questions about the procedures.

Competition

Introduction:

Competition occurs because resources on Earth are limited. These resources include biotic and abiotic factors in the environment. You may compete for first place in a race or first prize in a science fair. In nature, organisms compete for resources such as food, water, light, and space.

Materials:

- Plastic spoons (1 per student)
- Plastic beads or dry pinto beans (10 per student)
- Plastic cups (1 per student)

Grouping:

2 – 4 students per group

Procedure:

- 1) Your goal is to survive by collecting at least eight beads or beans. Spread ten beads or beans per person on a flat surface where all group members can reach them.

5. Have students work through the investigation recording data and observations in their science journal.

(Lesson Closure) – 10 minutes

6. Inform students that their ["ticket-out" \(link\)](#) is to answer the following guiding question:
 - How do organisms and populations in an ecosystem depend on and compete for biotic and abiotic factors?

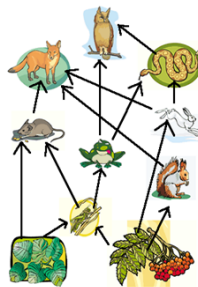
Lesson Objective – Day 4

Pose the guiding question for the lesson. To frame the students' learning, display the "I Can" statement: I can diagram the flow of energy through living systems. Let students know that today they will review the flow of energy through living systems, such as food chains, food webs, and energy pyramids.

Engage (Hook – Grab Students' Attention) – 5 minutes

1. Display the [food web \(link\)](#) so that all students can see it.

FOOD WEB



2. Pose the following question to the students, "How does energy flow through this living system?" Have students use the [Think-Pair-Share \(link\)](#) strategy to discuss with their elbow partner their thoughts and ideas. Debrief with the class.

Note: Remind students that the direction of the arrow represents the energy flow from one organism to another. For example, a squirrel eats nuts, so the arrow points from the nuts to the squirrel because the nuts provide energy to the squirrel when the nuts are eaten.

Explain (Teacher Input) – 5 minutes

3. Use the EduSmart video clip: **Components of a Food Chain (7.5C)** to review the components of a food chain and how energy flows through it.

Explore (Independent Practice) – 5 minutes

4. Have students draw and label a food chain in their science journal that includes the organisms listed below. Have students use the [Pairs Check \(link\)](#) strategy to check their food chain with their elbow partner. Use the [Paired Heads Together \(link\)](#) strategy to review and discuss students' responses.
 - Grasshopper
 - Hawk
 - Plant
 - Lizard

Explain (Teacher Input) – 5 minutes

5. Use the EduSmart video clip: **Food Webs** (7.5C) to review the components of a food web and how energy flows through it.

Explore (Independent Practice) – 10 minutes

6. Have students draw and label a food web in their science journal that includes the organisms listed below. Have students use the [Pairs Check \(link\)](#) strategy to check their food chain with their elbow partner. Use the [Paired Heads Together \(link\)](#) strategy to review and discuss students' responses.
 - Grasshopper
 - Hawk
 - Plant
 - Lizard
 - Snake
 - Rat

Explain (Teacher Input) – 5 minutes

7. Use the EduSmart video clip: **The Energy Pyramid** (7.5C) to review the components of an energy pyramid and how energy flows through it.

Explore (Independent Practice) – 10 minutes

8. Have students show the food chain from Step # 4 in a pyramid model in their science journal. The energy pyramid should include the organisms listed below. Have students use the [Pairs Check \(link\)](#) strategy to check their food chain with their elbow partner. Use the [Paired Heads Together \(link\)](#) strategy to review and discuss students' responses.
 - Grasshopper
 - Hawk
 - Plant
 - Lizard

Lesson Objective – Day 5

Pose the guiding question for the lesson. To frame the students' learning, display the "I Can" statement: I can describe predator/prey, producer/consumer, and parasite/host relationships as they occur in food webs within different ecosystems. Let students know that today they will read about different relationships found in an ecosystem including producer/consumer, predator/prey, and parasite/host.

Evaluate (Checking for Understanding) – 5 minutes

1. Have students refer to their notes from the previous day (Day 4).
2. Randomly call on students and solicit oral student responses (cold calling) to review how energy flows through living systems. Ask students the following questions: (1) What is the energy source for food chains, food webs, and energy pyramids? (2) What does the arrow represent in food chains and food webs? (3) In an energy pyramid, which layer has the greatest available energy? Which has the least energy? Why?

Explore (Reading to Learn) – 30 minutes

- Provide students the reading material [Relationships in Ecosystems \(link\)](#). Have students number from 1 to 3. Designate an area for the students who are "1s" to gather; do the same for the "2s" and "3s". Students will [jigsaw \(link\)](#) the reading and become an expert in their area.

Relationships in Ecosystems

Guiding Question: What relationships occur within ecosystems?	
What are two examples of a producer and two examples of a consumer?	<p>Organisms in ecosystems interact with other organisms. Organisms depend on each other for food, and sometimes for shelter, protection, and other life necessities. Some common relationships between organisms in an ecosystem include the relationships between producer and consumer, predator and prey, and parasite and host.</p> <p>What are Producers and Consumers?</p> <p>Every organism has a role in the movement of energy through its ecosystem. This is similar to the energy levels of organisms in an ecosystem. An organism's energy role is determined by how it obtains food.</p> <p>Producers</p> <p>Energy enters most ecosystems as sunlight. Some organisms, like plants, algae, and some types of bacteria, capture the energy of sunlight and store it as food energy. These organisms use the sun's energy to turn water and carbon dioxide into food molecules in a process called photosynthesis. An organism that can make its own food is a producer. Plants are the primary</p>

- Chunk the reading material into 3 parts and have students read their specified section. This sustained reading activity will take at least 15 minutes. You will need to monitor reading and facilitate group discussions.
- After groups have been given a significant amount of time to read and discuss the reading material assigned to them (about 15 minutes), have students reconfigure into groups of 3. Make sure that each student group has representation from the 1s, 2s, and 3s. Within each group, have each student take turns to "teach" the students in the group their assigned reading material.
- Discuss with students the main ideas and points of the reading material.

(Lesson Closure) – 10 minutes

- Inform students that their "[ticket-out \(link\)](#)" is to describe each of the following relationships found in an ecosystem:
 - Producer/Consumer
 - Predator/Prey
 - Parasite/Host

Lesson Objective – Day 6

Pose the guiding question for the lesson. To frame the students' learning, display the "I Can" statement: I can describe predator/prey, producer/consumer, and parasite/host relationships as they occur in food webs within different ecosystems. Let students know that today they will read about different relationships found in an ecosystem including producer/consumer, predator/prey, and parasite/host.

Evaluate (Checking for Understanding) – 15 minutes

- Provide each student the handout [Describing Relationships \(link\)](#). Have students identify the name of the relationship between the organisms in each of the different ecosystems. First, have the students work on this individually. Allow about 5 minutes.

Describing Relationships:

Think about the relationships that occur in food webs such as producer/consumer, predator/prey, and parasite/host. Describe the relationships in each of the different ecosystems by identifying which type of relationship is the best fit for each statement.

Descriptions: Marine Ecosystem	Relationship
Baleen whales eat phytoplankton	
Killer whales eat salmon	
Small fish use corals for their homes, but damage the coral	
Descriptions: Terrestrial Ecosystem	
A tarantula eats an ant	
A tick lives on the blood of deer, and the deer suffers from the loss of blood	
A rabbit eats some clover plant	
Descriptions: Freshwater Ecosystem	
Tapeworms infect stickleback white fish which makes them more buoyant so that they splash along at the surface of the water, making them easier to catch by a passing bird	
Lake plants are eaten by carp fish	
Mosquito fish eat mosquito larvae	

2. Have students use the [Pairs Check \(link\)](#) strategy to check their responses with their elbow partner. Use the [Paired Heads Together \(link\)](#) strategy to review and discuss students' responses.
3. Have students place this document in their science journal.

Explore (Independent Practice) – 20 minutes

4. Provide each student group (2 -3 students) the food webs found within [marine \(link\)](#), [freshwater \(link\)](#) and [terrestrial \(link\)](#) ecosystems.
5. For each food web, have the students identify and describe the following relationships: producer/consumer, predator/prey, and parasite/host.
6. Randomly call on students and solicit oral student responses (cold calling) to review students' responses. Clarify misconceptions that may occur.

(Lesson Closure) – 10 minutes

7. [Tweet It! \(link\)](#). Have students create a "tweet" to describe the different relationships that occur in food webs in different ecosystems. **Note:** A "tweet" is considered a message that contains 140 characters (letters & spaces). Students may work with an "elbow partner" to complete task.

Lesson Objective – Day 7

Pose the guiding question for the lesson. To frame students' learning, display the "I Can" statement: I can describe how biodiversity contributes to the sustainability of an ecosystem. Let students know that today they will review how biodiversity contributes to the sustainability of an ecosystem.

Engage (Hook – Grab Students' Attention) – 5 minutes

1. Use the EduSmart video clip: **Biodiversity and Ecosystem Sustainability** (7.10B) to review the concept of biodiversity and how biodiversity the sustainability of an ecosystem.

Explore (Reading to Learn) – 20 minutes

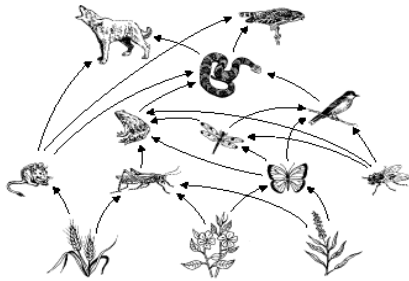
2. Refer students to Chap. 11 – Section 3 pp. 297 (Maintaining Biodiversity). Have students read this section using the [Paired Guided Reading \(link\)](#) strategy. Give them a purpose to read such as, "Read this information to be able answer the following questions: "Why is biodiversity important to an ecosystem?" "How is the United States helping to maintain biodiversity within an ecosystem?"
3. Debrief with class the main points of the reading section.

(Lesson Closure) – 10 minutes





4. Inform students that their ["ticket-out" \(link\)](#) is to answer the following question:
 - Why is it important to humans that ecosystems maintain biodiversity?

1. Given different food webs within different ecosystems, students will be able to describe relationships that occur with at least 80% accuracy.

TAKS 2006 Example:



In the food web above, which of the following organisms feeds on the largest variety of different producers?

- A 
- B 
- C 
- D 

Unit of Study: Organisms & Environments

Environmental Changes (5 days)

TEKS 8.11 The student knows that interdependence occurs among living systems and the environment and that human activities can affect these systems. The student is expected to:

(C) explore how short- and long-term environmental changes affect organisms and traits in subsequent populations.

Essential Question(s)

How could short- and long-term environmental changes as well as human activities affect living systems?

Guiding Question(s)

- What are short- and long-term environmental changes?
- How can subsequent populations be affected by environmental changes?

I Can Statements, I can...

- explain how changes in the environment can affect an organism and population
- identify short- and long-term environmental changes and explain how organisms respond to those changes
- explore how short- and long-term environmental changes affect organisms

Learning Plan

Materials:

Computer
Multimedia Projector
Speakers
Internet
Journal
Textbook
Index cards
Glue
Scissors
Chart paper
Markers

Engage – Day 1
(construction paper, jelly beans or objects)

[Adaptations](#) (foldable)

[Survival of the Fittest](#)
(construction paper, dry beans – black beans, kidney beans, lima beans)

[Oh Deer](#)

Instructional

Strategies:

Cues & Questioning
Modeling
Corrective Feedback
Discussion
Organizing Information
Journaling
Formative Assessment
[Stop and Jot](#)
[Paired Guided Reading](#)
[Paired Heads Together](#)

Lesson Objective – Day 1

Pose the guiding question for the lesson. To frame students' learning, display the "I Can" statement: I can explain how changes in the environment can affect an organism and population. Inform students that today they will be learning how environmental changes can affect organisms and populations.

Engage (Hook – Grab Students' Attention) – 25 minutes

Note: You may use other colors of jelly beans and construction paper. You may also use other objects and/or candy instead of jelly beans.

1. Have student groups place 20 black jelly beans and 20 red jelly beans on a piece of black construction paper. Call this Generation 1. Tell students to pretend the candies are fish and ask, "Which color would most likely be eaten first by the jelly bean shark?" "Why?"
2. Now, have each student group add five black jelly beans and take away five red ones. Call this group Generation 2. Ask students, Why do you think you added 5 black jelly beans and took away 5 red jelly beans between Generation 1 and Generation 2?" "What do you think happened between Generation 1 and Generation 2 in order for this to occur?" "How many fish and what color in this generation might survive the jelly bean shark?"
3. Have students write a reflection in their science journal of why the population of the black fish (jelly fish) might continue to increase and the population of the red fish (jelly beans) decreases.
4. Randomly call on students (cold calling) to share their reflections.

Explain (Teacher Input) – 10 minutes

5. Use the EduSmart video clip: **Adaptations** (8.11C) to introduce how organisms have adaptations that make them more suitable to its environment. When the videos stops, have students use the [Stop and Jot](#) (link) strategy to summarize learning and answer questions in their science journal. After viewing the video, students should be able to answer the following questions: (1) What are adaptations? (2) Why are adaptations important to organisms? (3) How do organisms adapt to short-term environmental changes? (4) How do organisms adapt to long-term environmental changes?
6. Inform students that in the next couple of days they will further explore organisms' adaptations to short- and long-term environmental changes.

Vocabulary:

- Adaptations
- Seasonal adaptations
- Dormancy
- Migration
- Natural selection
- Biodiversity
- Habitat destruction
- Overpopulation
- Resource depletion

Academic Vocabulary:

- Describe
- Interaction
- Analyze
- Contribute
- Extinction
- Subsequent
- Dependence
- Resources
- Modify

Student Work:

- Journal responses
- Lab investigations
- Foldable
- Frayer model
- Magnet summary

ELPS Stems:

- The ___describes...
- Overall our objective is...
- ___ best represents ___
- It's important to remember ...

Grouping:
Whole Class
Individual
Pairs
Triad (3)
Quad (4)

The AVID Way:

Writing:

- Interactive Notebook (science journal)
- Stop and Jot

Inquiry:

- Survival of the Fittest
- Oh Deer

Collaboration:

- Stop and Jot
- Paired Guided Reading
- Paired Heads Together

Reading:

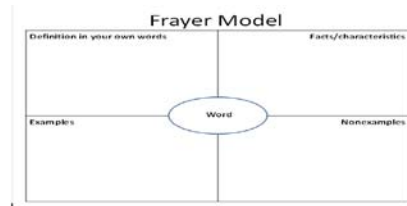
- Textbook reference
- Reading passage

Online Supplemental Aids for New TEKS:

[Retrieve/Access Directions](#) (link)

(Lesson Closure) – 10 minutes

7. In their science journals, have students create Frayer Models for the following word:
Adaptations.



Lesson Objective – Day 2

Pose the guiding question for the lesson. To frame the students' learning, display the "I Can" statement: I can identify short- and long-term environmental changes and explain how organisms respond to those changes. Let students know that today they will explore organisms' adaptations to short-term environmental changes.

Evaluate (Checking for Understanding) – 5 minutes

1. Randomly call on students and solicit oral student responses (cold calling) to assess their understanding of adaptations. Have them complete the following statement, "Adaptations are ____ and an example is..."

Explain (Teacher Input) – 30 minutes

2. Provide students with the foldable [Adaptations](#) (link) and have them glue it into their science journal.
3. Use the EduSmart video clip: **Seasonal Adaptations** (8.11C) to explain how organisms adapt to this short-term environmental change. Have students use the [Stop and Jot](#) (link) strategy so they can take notes using the foldable in the science journal. Review with students information about seasonal adaptations. Students should have the following information in their notes.
 - Seasonal adaptations can be physical or behavioral
 - Physical changes are structural adaptations, such as thicker fur or extra fat in the winter
 - Examples of behavioral adaptations would be an organism changing their diet or a squirrel gathering and storing nuts
4. Use the EduSmart video clip: **Dormancy: Hibernation and Diapause** (8.11C) to explain how organisms adapt to this short-term environmental change. Have students use the [Stop and Jot](#) (link) strategy so they can take notes using the foldable in the science journal. Review with students information about seasonal adaptations. Students should have the following information in their notes.
 - Dormancy is when an organism goes through a period of time with no activity or no growth, such as trees in winter
 - Hibernation is a physiological adaptation when an organism's breathing and heart rate slows down and their temperature drops, such as chipmunks and squirrels
 - Diapause is a physiological adaptation of insects such as the lady beetle in winter
 - Diapause can occur in extreme temperatures, drought, and reduced food availability
5. Use the EduSmart video clip: **Migration** (8.11C) to explain how organisms adapt to this short-term environmental change. Have students use the [Stop and Jot](#) (link) strategy so they can take notes using the foldable in the science journal. Review with students information about seasonal adaptations. Students should have the following information in their notes.
 - Migration is a behavioral adaptation in which an organism moves from one place to another, such as snow geese, monarch butterflies, earthworms, and antelope
 - Migration may occur for a season (short-term environmental change)
 - Removal migration is a behavioral adaptation in response to a long-term environmental change

Laying the Foundation:

[Tragedy in the Making-Fishing the Global Commons](#)
[Greenhouse Effect-Investigating Global Warming](#)

EduSmart:

Environmental Changes and Organisms (8.11C)

- Adaptations
- Seasonal Adaptations
- Dormancy: Hibernation and Diapause
- Migration
- Natural Selection

Ignite! Learning - Science:

Unit: Life Science

Lesson: Ecosystems

Topic # 12 Sudden Changes in Ecosystems

- Change and Survival
- Topic # 9 Succession
 - Primary & Secondary Succession
 - Ecological Succession

(Lesson Closure) – 10 minutes

6. Have students develop a Magnet Summary for the term "short-term environmental adaptations" in their science journal.

Describing Words	Original Sentence with describing words from front of the card
Describing Words	
Magnet Word	
Describing Words	

Lesson Objective – Day 3

Pose the guiding question for the lesson. To frame the students' learning, display the "I Can" statement: I can identify short- and long-term environmental changes and explain how organisms respond to those changes. Let students know that today they will explore organisms' adaptations to long-term environmental changes.

Evaluate (Checking for Understanding) – 5 minutes

1. Randomly call on students and solicit oral student responses (cold calling) to assess their understanding of short-term environmental adaptations. Have them complete the following statement, "An example of a short-term adaptation is..."

Explain (Teacher Input) – 10 minutes

2. Use the EduSmart video clip: **Natural Selection** (8.11C) to explain an organism's adaptations to long-term environmental changes. When the videos pauses, have students use the [Stop and Jot \(link\)](#) strategy to summarize learning and answer questions in their science journal. After viewing the video, students should be able to answer the following questions: (1) What are factors that may cause long-term changes to the environment? (2) How could these environmental changes affect organisms living in the area? (3) What is the difference between an advantageous trait and a disadvantageous trait? (4) Why is an advantageous trait important to an organism? (5) What is natural selection? (6) What happens if an organism is unable to adapt to long-term environmental changes?

Explore (Reading to Learn) – 20 minutes

3. Assign Chap. 10 - Section 2: pp. 259 – 261 (Changing with the Environment) for students to read using the [Paired Guided Reading \(link\)](#) strategy. Give them a purpose to read such as, "Read about natural selection (pp. 259 – 261) and be able to answer the following questions. (1) What are the four steps in natural selection? (2) Why is genetic variation within populations so important?"
4. Use the [Paired Heads Together \(link\)](#) strategy to review and discuss Chap. 10 – Section 2: pp. 259 – 261.

(Lesson Closure) – 10 minutes

5. Inform students that their ["ticket-out" \(link\)](#) is to complete the following sentence stem:
 - It's important to remember about natural selection...

Lesson Objective – Day 4

Pose the guiding question for the lesson. To frame the students' learning, display the "I Can" statement: I can explore how short- and long-term environmental changes affect organisms. Let students know that today they will investigate how natural selection can affect a population.

Evaluate (Checking for Understanding) – 5 minutes

1. Randomly call on students and solicit oral student responses (cold calling) to assess their understanding of natural selection.

Explore (Guided Practice) – 35 minutes

2. Provide student groups with the lab [Survival of the Fittest](#) (link). Have students read through the investigation identifying unfamiliar vocabulary terms. Model the investigational procedures and check for students' understanding.

Survival of the Fittest

Objective: To simulate the process of natural selection using various backgrounds and different colored beans.

Materials (per student group):

- Black construction paper
- Green construction paper
- 50 each of the following dry beans –
 - Black beans
 - Lima beans
 - Kidney beans

Procedure:

- 1) Place all of the beans onto the green construction paper.

3. Have students complete the data chart and analysis questions in their science journal.

(Lesson Closure) – 5 minutes

4. Have students return the lab materials and discuss their finding from the lab investigation.

Lesson Objective – Day 5

Pose the guiding question for the lesson. To frame the students' learning, display the "I Can" statement: I can explore how short- and long-term environmental changes affect organisms. Let students know that today they will investigate how environmental changes can affect a population.

Evaluate (Checking for Understanding) – 5 minutes

1. Randomly call on students and solicit oral student responses (cold calling) to assess their understanding of natural selection. Ask students how the lab investigation, Survival of the Fittest, simulated natural selection.

Explore (Guided Practice) – 30 minutes

2. Explain to students they will participate in a lab investigation to help understand how environmental changes can affect a population. For full details of investigation, click [Oh Deer](#) (link).

(Lesson Closure) – 10 minutes

3. Have students complete the graph showing the change of the deer population over time and answer the questions.
4. Review students' responses with the class.

Evaluation - Assessment Evidence – 10 minutes

1. Given different environmental situations, students will explain how competition determines which organisms survive within the ecosystem with at least 80% accuracy.

District FMA Example:

What is most likely to happen if an environment changes and a species does not have variations that are helpful in the new conditions?

- A) Members of the species will try to change the environment.
- B) Members of the species will develop new adaptations.
- C) A new species will form from the existing species.
- D). The species will become extinct.

Unit of Study: Organisms & Environments

Human Impact on Oceans (4 days)

TEKS 8.11 The student knows that interdependence occurs among living systems and the environment and that human activities can affect these systems. The student is expected to:

(D) recognize human dependence on ocean systems and explain how human activities such as runoff, artificial reefs, or use of resources have modified these systems.

Essential Question(s)

Why is it important to have a healthy ocean system?

Guiding Question(s)

- How do humans depend on ocean systems?
- How have our human actions modified ocean systems?

I Can Statements, I can...

- recognize human dependence on ocean systems
- explain how human activities have modified ocean systems

Learning Plan

Materials:

Computer
Multimedia Projector
Speakers
Internet
Journal
Textbook
Index cards
Glue
Scissors
Chart paper
Markers

[Is There Kelp in Your House?](#) (reading passage)

[The Effects of Over-fishing](#) (bowl, goldfish crackers)
Cleaning Up an Oil Spill (plastic container, vegetable oil, various materials such as plastic spoon, paper towels, liquid dish detergent, etc.)

[Who Polluted the Guadalupe River](#) (large, plastic container, water, film canisters or small plastic cups, various materials such as marshmallows, dry leaves, vegetable oil, food coloring, etc.)

Lesson Objective – Day 1

Pose the guiding question for the lesson. To frame students' learning, display the "I Can" statement: I can recognize human dependence on ocean systems. Inform students that today they will be learning how humans depend on ocean systems.

Engage (Hook – Grab Students' Attention) – 10 minutes

1. Pose the following question to the students: "Why are ocean systems important to humans?" Have students use [Think-Pair-Share](#) (link) strategy to discuss with the question with their elbow partner. Use the [Paired Heads Together](#) (link) strategy to review and discuss students' responses

Explore (Reading to Learn) – 20 minutes

2. Provide students with the reading passage [Is There Kelp in Your House?](#) (link). Have students use the Pen-in-Hand strategy as they read the passage. Provide students with highlighters so they can highlight important information.

Is There Kelp in Your House?

Guiding Question: How do humans depend on ocean systems?

Do you have kelp in your house? Chances are you do! Kelp and other seaweeds are used in a variety of common foods and household items. Seaweed acts as stabilizers, thickeners, and colorants.

Seaweeds are not really weeds but large forms of marine algae that grow in the coastal ocean waters of many countries. They include thousands of species ranging from microscopic plants called phytoplankton to giant floating or anchored plants.

The three main groups of seaweed are brown, red, and green algae, each providing important ingredients for the manufacture of food and other products. Alginates, carrageenan, and beta carotene are names for the algae products in your house.

Alginates, which come from brown algae, help sauces and syrups pour smoothly and keep their texture. They are also used in many dry mixes, like pancake mix, to help the product quickly absorb liquid and keep the ingredients from separating once they are mixed. Also, alginates are used in cosmetics such as lipstick. This seaweed helps keep a lipstick's texture smooth and makes it flow easily.

Carrageenan is an ingredient found in many kinds of red algae which help change liquids into gels. It's used to gel foods like ice cream, cosmetics, medicine and other products.

Beta carotene is a natural pigment derived from green algae and other sources. Beta carotene can be found in many food items, such as, yellow and orange cheese, mayonnaise, and salad dressing.

Based on what you just read, in the space below, draw or jot down what you find in your house with algae in it.

3. After students have read the material, have them jot down and/or draw products found in their home they believe are made from ocean seaweed. Discuss and review students' responses.

Vocabulary:

- Pollution
- Biodiversity
- Habitat destruction
- Overpopulation
- Resource depletion

Academic Vocabulary:

- Dependence
- Resources
- Modify

Student Work:

- Journal responses
- Lab investigations
- The Effects of Overfishing (investigation)
- Who Polluted the Guadalupe River (investigation)
- Ticket out

ELPS Stems:

- A valid conclusion is...
- Even though it doesn't say __, I think...
- The general idea is ...
- You asked __. I think ...

Laying the Foundation:

N/A

EduSmart:

Human Impact on Ocean Ecosystems (8.11D)

- Oceans & Life
- Marine Ecosystems
- Over-Fishing
- Ocean Resources

Instructional

Strategies:

Cues & Questioning
Modeling
Corrective Feedback
Discussion
Organizing Information
Journaling
Formative Assessment
[Think-Pair-Share](#)
[Paired Heads Together](#)
[Stop and Jot](#)
[Pairs Compare](#)
[Teammates Consult](#)
[Numbered Heads Together](#)

Grouping:

Whole Class
Individual
Pairs
Triad (3)
Quad (4)

The AVID Way:

Writing:

- Interactive Notebook (science journal)
- Stop and Jot

Inquiry:

- Is There Kelp in Your House?
- The Effects of Over-fishing
- Who Polluted the Guadalupe River

Collaboration:

- Think-Pair-Share
- Paired Heads Together
- Stop and Jot
- Pairs Compare
- Teammates Consult
- Numbered Heads Together

Reading:

- Textbook reference
- Reading passage

Online Supplemental Aids for New TEKS:

[Retrieve/Access Directions](#) ([link](#))

Explain (Teacher Input) – 10 minutes

4. Use the EduSmart video clips: **Oceans & Life** (8.11D) and **Marine Ecosystems** (8.11D) to explain human dependence on the oceans. When the videos pauses, have students use the [Stop and Jot](#) ([link](#)) strategy to summarize learning and answer questions in their science journal. After viewing the video, students should be able to answer the following questions: (1) How could a fishing net abandoned far away at sea have an effect on a beach? (2) What are examples of human activities that affect the ocean? (3) What are the differences between an undisturbed coral reef and a disturbed coral reef? (4) How does a disturbed reef affect the biodiversity? (5) What role does phytoplankton have on earth? (6) How do humans depend on phytoplankton?

(Lesson Closure) – 5 minutes

5. Inform students that their "[ticket-out](#)" ([link](#)) is to answer the following question:
 - What are two examples of how humans depend on ocean systems?

Lesson Objective – Day 2

Pose the guiding question for the lesson. To frame students' learning, display the "I Can" statement: I can explain how human activities have modified ocean systems. Let students know that today they will investigate how over-fishing impacts an ocean's ecosystem.

Evaluate (Checking for Understanding) – 5 minutes

1. Ask students the guiding question: How do humans depend on ocean systems? Have students use the [Pairs Compare](#) ([link](#)) strategy to generate ideas, and then compare their answers with another pair, and then see if working together they can come up with additional responses. Have students record responses in a matrix in their science journal.

I thought...
We thought...
Others thought...
We concluded...

Explore (Guided Practice) – 30 minutes

2. Have students simulate the effects of over-fishing an area by performing the investigation [The Effects of Over-fishing](#) ([link](#)). Students should record data and analysis in their student journal

The Effects of Overfishing

Background information: The carrying capacity is the total number of organisms of a particular species that can be supported by a habitat. Available resources such as food, water, space, and light are limiting factors for population growth. As a population increases in size, more and more individuals compete for these resources. Eventually, the population of the species declines to a size where the resources can meet its needs.

Objective: To simulate the effects of what could happen if over-fishing occurs in an area.

Materials (groups of four):

- Goldfish crackers (16 per group)
- Large bowl or container (per group)

Instructions:

- Place 16 goldfish crackers into each group's bowl to begin the simulation.
- The rules of the simulation:
 - Carrying capacity of the "ocean" is 16 fish.
 - Harvest as many fish as possible and receive 1 point for each four fish collected.
 - After each fishing trip, one fish will be added to the container for every fish left in the bowl.
- After 4 trials, ask student groups to share their "ocean" with another group.

Procedures:

You and your three group members are about to go on a fishing trip in an area where many other countries fish. Here

3. Debrief with the students their findings based on their data and analysis. Ask questions such as the following:
 - Why did you start with 16 fish in the "ocean" bowl?
 - Why did we replace some fish after each fishing trip?
 - What happened if a group became greedy for points and caught too many fish?
 - How does this simulation resemble what could occur to the real ocean if over-fishing occurs?

Explain (Teacher Input) – 5 minutes

4. Use the EduSmart video clip: **Over-fishing** (8.11D) to review and reinforce the effects of over-fishing.

- Artificial Reefs
- Effects of Pollution on Oceans

(Lesson Closure) – 5 minutes

5. Inform students that their "[ticket-out](#)" ([link](#)) is to answer the following question:
 - How does over-fishing affect a food web?

Lesson Objective – Day 3

Pose the guiding question for the lesson. To frame students' learning, display the "I Can" statement: I can explain how human activities have modified ocean systems. Let students know that today they will investigate how human activities, such as ocean drilling have modified an ocean system.

Engage (Hook – Grab Students' Attention) – 5 minutes

1. Use the EduSmart video clips: **Ocean Resources** (8.11D) to introduce how ocean resources can be affected by offshore drilling.

Explore (Guided Practice) – 30 minutes

2. Have students perform the investigation, Cleaning Up an Oil Spill (TE p. 480). Give each student group (3 – 4 students) a pan of water and about 5 mL of vegetable oil. Have the students add the vegetable oil to the water. Ask students, "How could you remove the oil without pouring out the water?" Have students use the [Teammates Consult](#) ([link](#)) strategy to discuss and record answers.
3. Provide the following materials: toothpicks, plastic spoon, paper towels, baby powder, sponge, straws, liquid dish detergent, eye dropper, etc. Have students choose one item and allow students to see who can remove the oil the fastest and the most completely.
4. Have students use the [Teammates Consult](#) ([link](#)) strategy to discuss and record answers to the following questions: (1) How are humans responsible for oil spills? (2) What effect does an oil spill have on the ocean and other resources found in the ocean? (3) What factors would be important in containing an oil spill in the ocean?
5. Use the [Numbered Heads Together](#) ([link](#)) strategy to discuss students' responses.
6. Have clean their work areas and return materials.

Explain (Teacher Input) – 5 minutes

7. Use the EduSmart video clips: **Artificial Reefs** (8.11D) to explain how oil rigs and sunken ships can modify an ocean system.

(Lesson Closure) – 5 minutes

8. Inform students that their "[ticket-out](#)" ([link](#)) is to answer the following question:
 - What are the positive and negative effects of offshore drilling?

Lesson Objective – Day 4

Pose the guiding question for the lesson. To frame students' learning, display the "I Can" statement: I can explain how human activities have modified ocean systems. Let students know that today they will investigate how human activities, such as pollution have modified an ocean system.

Evaluate (Checking for Understanding) – 5 minutes

1. Ask students the guiding question: How do humans modify ocean systems by offshore drilling? Have students use the [Pairs Compare](#) ([link](#)) strategy to generate ideas, and then compare their answers with another pair, and then see if working together they can come up with additional responses. Have students record responses in a matrix in their science journal.

I thought...
We thought...
Others thought...
We concluded...

Explain (Teacher Input) – 5 minutes

2. Use the EduSmart video clips: **Effects of Pollution on Oceans** (8.11D) to introduce how ocean resources can be affected by pollution.

Explore (Guided Practice) – 30 minutes

3. Inform students that through an interactive story, [Who Polluted the Guadalupe River](#) (link), they will learn how our rivers have become polluted and as a result, our ocean system.

Who Polluted the Guadalupe River?

Through an interactive story, students learn how many of our rivers have become polluted as a result of increase in human population and changes in land usage. This example demonstrates that as we each contribute to the problem, so must we also be a part of the solution.

Materials:

- Use a container of water to represent the river
- Black film canisters (one/student, available for free at film processing stores)
- Canister ingredients (safe for handling) – for dry ingredients fill canisters halfway full, for wet ingredients fill canisters full
 - Construction site: clay soil
 - Trees: dry crumpled leaves
 - Family picnic: assorted litter or multi-colored marshmallows
 - Fisherman: broken spaghetti noodles
 - Farmers: baking soda & green marshmallows
 - Gardeners: baking soda & green marshmallows
 - Barnyard: brown liquid (coffee or hot chocolate) & yellow marshmallows
 - Homeowners: dilute yellow food coloring, raisins, toilet paper & yellow marshmallows
 - Tubers: pieces of aluminum
 - Electric plant: blue vinegar
 - Commuters: vinegar & few drops of vegetable oil
 - Washing the car: soapy water
 - Antifreeze: dilute blue food coloring
 - Motorboat: vegetable oil

4. Prepare materials and randomly pass out containers to the students. Explain that you will read a story about the river and that each of them plays a part in the story. When they hear the name of their character in the story, they should open their containers and empty the contents into the watershed.
5. Pause after reading the story's questions to allow students time to respond. At the end of the activity, discuss students' thoughts, feelings, ideas, etc.

(Lesson Closure) – 5 minutes

6. Inform students that their ["ticket-out"](#) (link) is to answer the following question:
 - How does the pollution of a river affect an ocean system?

Evaluation - Assessment Evidence – 10 minutes

1. Given different scenarios, students will correctly identify and explain how humans have affected ocean systems with 80% accuracy.

District FMA Example:

Which of the following is not a measure to deal with problems of overfishing?

- A) limiting the size of fish that can be caught
- B) limiting the number of fish that can be caught
- C) building artificial reefs where fish can breed
- D) limiting the use of fertilizers that create dead zones